



A Study on the Prevalence of Diabetic Complications in Fasa Diabetes Clinic

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ABSTRACT: Diabetes is a chronic disease with increasing prevalence which its treatment have a high cost and burden of disease. This study aimed to investigate the prevalence of diabetes complication in the patients referred to Fasa diabetes clinic. This was a cross-sectional study from March 2009 up to September 2013 among 1131 referred diabetes patients. Anthropometric and demographic data were gathered, type of diabetes, duration of disease, blood pressure, serum glucose and lipid profile were measured. Chronic complications including neuropathy, retinopathy, nephropathy, cardiovascular disease and diabetic foot were recorded based on the physician reports. Mean±SD of age for diabetic patients was 51.8±12.9, less than one percent had gestational diabetes, 2.8% were diagnosed by type I diabetes and 96% had type II diabetes mellitus which 15.2% of them used insulin therapy, 81.1% oral hypoglycemic agents and 2% followed a dietary plan. More than one third of subjects had uncontrolled hyperlipidemia or hypertriglyceridemia. Neurologic and cardiovascular diseases were the most prevalent complications between diabetes patients; 33.8% and 26.8%, respectively. The prevalence of diabetic foot was 2.4%. The high prevalence of diabetic complications was considerable in Fasa diabetes patients. The lack of control for risk factors such as cholesterol, triglyceride, blood sugar and blood pressure make quality of treatment a major concern in Fasa.

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INTRODUCTION

Diabetes is a chronic disease with an increasing prevalence which has become a major global health problem (Grobbee, 2003). International Diabetes Federation (IDF) reported that the worldwide prevalence of diabetes afflicted 366 million people in 2011. The number is expected to rise to 552 million by 2030. Most people with diabetes are living in low and moderate income countries in which there would be the highest number of cases in future years (Whiting et al., 2011). In Iran, the prevalence of the disease has been estimated at about 16 million among over 20-year-old population in 2001 (iLarijan et al., 2005). Based on a population nation scale, the IDF Report estimated that the prevalence of adjusted diabetes was 9.3% in 2011 and it would amount to 13.1% in 2030 (Whiting et al., 2011). Seemingly, an increase in the prevalence of diabetes results from increasing such risk factors as obesity, sedentary lifestyle, and aging and better medical treatment has led to greater longevity of patients with diabetes (Whiting et al., 2011). Diabetes-induced complications as macrovascular and microvascular disorders are the significant causes of morbidity and mortality among diabetic patients. The irreversible complications of diabetes are due to glycation

in different organs (Gregg et al., 2000). Improper glycemic control and hypertension could be the causes of retinopathy, neuropathy, nephropathy, cardiovascular diseases, and diabetic foot (Ahmed, 2005). Morbidity and mortality due to diabetes puts a heavy economic burden on health care system. In the United States, the estimated total economic cost of diagnosed diabetes in 2012 was \$245 billion, a 41% increase from previous estimate of \$174 billion (in 2007); this estimate highlights the substantial burden that diabetes imposes on society (American Diabetes Association, 2013).

The chronic complications of diabetes are common all over the world (Bos and Agyemang, 2013). The most common complication, retinopathy, is known as the main cause of blindness in 20-70 year old adults in developed countries (Frank, 2004). Amputation and disability have a high cost for patients and health organizations. However, the prevalence and pattern of complications vary with the countries and regions. The systematic review of 25 published articles indicated that microalbuminuria, macroalbuminuria and retinopathy are highly prevalent and cardiovascular diseases are prevalent, too (Amini and Parvaresh, 2009). Aging can worsen the diabetes control

and heighten the prevalence of diabetes complications so that a large number of affected by diabetes are more seen in over 50 year old patients (Grobbee, 2003).

The estimation of the prevalence of diabetes complications is important for both community and health organizations as people would be attracted toward the disease and its irreversible complications. In addition, in health care system, it would motivate the cooperation for both the prevention of the disease as it imposes high cost of treatment on the patients and the control of the disease since it reduces the workforce of the patients causing irreversible complications. The present study aimed at reporting the prevalence of diabetes complication and identifying the various biochemical and demographic characteristics related to the complications in patients from Fasa Diabetes Clinic.

MATERIALS AND METHODS

This is a cross- sectional study of diabetes outpatients who referred to Diabetes Clinic of Fasa in southeast of Fars province, Iran. All diabetes patients recruited between March 2009 till September 2013 were included (n=1131) and completed for 978 subjects. A trained technician did all the measurements and filled out the questionnaires. Height and weight (without shoes and minimum clothing) were recorded with the precision of 0.5 cm and 100 grams respectively by a digital weighing scale and stadiometer. BMI (Body Mass Index) was calculated by weight (kg) ÷ height (m²). In addition, blood pressure and biochemical profile including: total cholesterol, triglyceride, glucose and hemoglobin A1C were measured after 10-12 hr overnight fasting.

Afterwards, a physician examined the patients carefully and recorded the subjects' retinopathy, nephropathy, neuropathy, cardiovascular diseases and their diabetic foot, if any. The diagnosis of nephropathy was based on the amount of protein in 24-hr urine sample analysis. The study participants' ophthalmologic diseases were recorded as retinopathy; however, their severity was not measured. Diabetic neuropathy was diagnosed by a neurologist. Cardiovascular diseases would have been determined if a report by the consultant cardiologist had been obtained. Hypertension and hyperlipidemia were

defined through guidelines for 2013 diabetes management (Executive summary, 2013). Therefore, systolic blood pressure ≥ 14 mmHg and diastolic blood pressure ≥ 9 mmHg, triglyceride (TG) ≥ 150 mg/dl, and total cholesterol (TC) ≥ 200 mg/dl were recognized as hypertension, hypertriglyceridemia and hypercholesterolemia, respectively.

The data analyzed by SPSS software version 20. The mean, standard deviation (±SD) and percentage were reported. Kolmogorov-Smirnov test was used for normality test. The T-test, ANOVA and x² were used for comparison between the groups. p<0.05 was considered significant.

RESULTS

The present study included 978 diabetic patients of whom 57.9% were female and 42.1% male. 933 subjects had diabetes type 2 and 2.8% diabetes type 1 and less than 1% was diagnosed as gestational diabetes mellitus. 13% of the study participants were smokers. The patients' demographic characteristics, age, weight and BMI are shown in Table 1.

31.9% of the subjects had normal BMI and 64.7% were overweight/ obese. A large number (n=756, 81.1%) of the subjects with diabetes type 2 took oral hypoglycemic agents and 15.2% (n=159) had insulin injection and less than 2% followed a controlled glycemic diet.

The prevalence of hypertriglyceridemia (TG ≥ 150 mg/dl) and hypercholesterolemia (TC ≥ 200 mg/dl) was 51% and 35.8%, respectively. The mean ±SD for fasting blood sugar of the patients taking hypoglycemic agents was 191.5 ± 68.9 mg/dl, the patients given insulin injection was 206.8 ± 97.0 mg/dl and those going on the special diet was 142.0 ± 50.4 mg/dl. There was a significant difference (p<0.05) between the latter group and the very first two groups.

More than half of the subjects had diabetic complications. The prevalence of neurologic disorders was 33.8%, 26.8% of cardiovascular disorders, 11.7% of nephropathic disorders and 10.4% retinopathic ones. 16 patients (2.4%) had diabetic foot.

Table1. Demographic characteristics of patients in Fasa Diabetes Clinic

Variable		Type I	Type II	
			Oral medications	Insulin
Age (year)		22.5±5.5	53.8±10.2	47.7±15.7
Body Mass Index (kg/m ²)		21.7±3.8	27.4±4.1	24.9±5.3
Education level (%)	<diploma	41.2	46.9	50.6
	≥diploma	52.8	18.3	22.9
No complications (%)		50	40.9	36.2
Diabetes duration (year)		8.8±5.3	10.1±9.2	7.8±7.7

Table 2. Comparison of blood profile and blood pressure in male and female with type 2 diabetes

Variable	Male	Female	P value
Age (Year)	53.2±13.1	50.8±11.4	0.017
BMI (kg/m ²)	26.8±4.2	27.1±4.7	N.S
Duration of disease (year)	11.1±6.2	8.0±5.5	0.000
FBS (mg/dl)	197.0±78.1	189.9±72.2	N.S
Hb A1C (%)	9.5±2.6	8.6±1.9	0.07
Triglycerides (mg/dl)	203.6±110.1	203.7±108.5	N.S
Total Cholesterol (mg/dl)	191.4±57.6	201.5±48.9	0.032
SBP (mmHg)	125.7±19.7	123.7±16.9	N.S
DBP (mmHg)	78.1±8.8	77.3±11.3	N.S

BMI: Body Mass Index, FBS: fasting blood sugar, SBP: systolic blood pressure, DBP: diastolic blood pressure, NS: not sig

The prevalence of neurologic complications was much higher in women compared to men: 76.1% vs. 23.9%, $p<0.001$. However, there was not any significant difference between the two groups in terms of retinopathy, cardiovascular diseases, and diabetic foot. Microalbuminuria was reported in 43 men and 34 women, $p<0.01$. Mean of age and duration of disease were significantly different between men and women (Table2). After BMI adjustment, the prevalence of complications and the duration of suffering from the disease was higher in female than male group ($p<0.05$). There was no significant difference in mean of biochemical profile and blood pressure of men and women, except for hemoglobin A1C (Table2).

The prevalence of complications was significantly higher in patients with longer duration of diabetes. Neuropathy and cardiovascular disease were common in overweight/ obese group; $x^2=10.0$ and $x^2=9.65$, respectively ($p<0.05$ for both). However, the subjects with higher education and a controlled dietary intakes were shown to have smaller number of complications ($p<0.05$).

DISCUSSION

Neuropathy and cardiovascular diseases were the most common complications among 978 outpatients from Fasa Diabetes Clinic. There was a gender disparity in the reported complications so that nephropathy and neuropathy were more prevalent in men than women, respectively. The patients who went on a diabetic diet had lower fasting blood sugar and complications rate than the others. There was a reverse correlation between diabetes complications and the subjects' level of education. There was a direct correlation between complications and BMI, and the duration of disease.

Retinopathy is the most prevalent complication of diabetes in developed countries, but the reported prevalence for retinopathy in our region is similar to that of other central parts of Iran. The prevalence of retinopathy in diabetes subject of developing countries was reported 10-61% (Ruta et al., 2013). Most of the

studies in different regions of Iran reported the prevalence of retinopathy in the range of 30–40% (Aghadoost and Sadr, 2000; Habibi Moeini et al., 1999; Manaviat et al., 2004).

This study showed that cardiovascular diseases were common among study participants. A considerable number of untreated patients with hyperglycemia and hyperlipidemia need to be more considered. The study revealed that rising prevalence of overweight/ obesity, consumption of saturated fats and trans fatty acids among patients with diabetes are triggers of risk factors for cardiovascular complications (The diabetes and nutrition study group, 2006). However, hyperlipidemia and hypertension can be prevented by lifestyle modification, and weight control especially in older subjects.

A small number of patients had dietary plans with significant lower fasting blood sugar and complications which might highlight the role of nutritional management and nutrition counseling in chronic diseases.

Janghorbani et al. found that there was a high prevalence (71.5%) of diabetes-induced neuropathy among their study participants (Janghorbani et al., 2006). However, in three other published studies, conducted in Tehran, Mashhad and Hamedan (in Iran) the researchers reported that there was a lower prevalence of diabetes-induced neuropathy 33.3% (Habibi Moeini et al., 1999), 41.6% (Khazai et al., 2006) and 45.7% (Kiani et al., 2013), respectively. These findings are similar to those of the present study.

There was paucity in studies for gender differences, but in a study of Italian diabetes patients neuropathy was reported to be common among women and showed poorer quality of diabetes care than men (Rossi et al., 2013). In most Iranian studies, the prevalence of neuropathy was higher than that of reported in such countries as Turkey (14%) and Libya (11.5%) (Erbaş et al., 2011; Elhewengi et al., 2012).

The prevalence of albuminuria in the study participants ranged from 21 to 22% which was similar to that of such North African countries as Sudan, but nephropathy was reported to vary from 6.7% in outpatients

to 46.3% in inpatients (Herman et al., 1998; Hamed et al., 2008; Elbagir et al., 1995). Microalbuminuria and nephropathy have a highly variable prevalence as the way of urine sample collection may be different in studies.

The results on the prevalence of diabetic foot ulcers among the study participants showed that it was low closely corresponding to another study in Iran which was 2.0% (Khazai et al., 2006). We did not investigate the prevalence of amputation.

Conclusion: The prevalence of cardiovascular diseases and neuropathy was high among Fasa diabetes patients. In addition, more than half of them did not manage their blood pressure, blood glucose, and blood lipids which could aggravate diabetes conditions and complications; thereby, imposing high cost and burden of disease on the patients and health system.

Though working meticulously on the present study, the researchers had some limits one of which was the type of the study design which was a cross-sectional one as it involved data collected at a defined time. The other limits included the poor compliance of the referred subjects for follow-ups, doing lab tests and undergoing clinical physical exams to determine the diabetes complications.

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